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Tsunami Newsletter

INTERNATIONAL TSUNAMI INFORMATION CENTER - ITIC

Four ITIC Directors attended the Second Tsunami Symposium held at the East-West Center of the University of Hawaii, at the end of May, 2002.

Pictured from left to right are: Dr. Charles (Chip) McCreery, director from 1996-1997, Michael Blackford, 1997-2002, Dr. Laura Kong, 2002-present and Dr. George Pararas-Caryannis, 1975-1992. More about the Second Tsunami Symposium on page 5.

SUMMARY OF EARTHQUAKES IN THE PACIFIC
Occurring April-May, 2002

With surface wave or moment magnitude (M_w) greater than or equal to 6.5 and a depth no greater than 100 km, or an event for which a Tsunami Information Bulletin (TIB) or Regional Watch Warning (RWW) was issued. Epicenter and M_w from USGS/NEIC (G); preliminary M_s from PTWC (P) at time of action; M_w and depth from Harvard (H).

DATE	LOCATION	TIME (UTC)	LAT.	LONG.	DEPTH (km)	M_S	M_W	PTWC ACTION	ACTION (UTC)	Tsunami ?
26 April	Vicinity of Mariana Islands	16:06	13.404N	144.599E	67.5	6.8 (P) 6.6(G)	7.1 (H, G)	TIB	16:34	NO

ITIC HOSTS VISITING EXPERTS

The 2002 ITIC Visiting Experts Program was held May 28-June 11, 2002, in Honolulu, Hawaii. This year, ITIC hosted two scientists from South America, Patricia Arreaga Vargas, Tsunami Program Coordinator at INOCAR, Instituto Oceanografico de la Armada, Ecuador, and Sergio Rouillon Pardo, Logistics Chief at HIDRONAV, Direccion de Hidrografia y Navegacion, Peru. The participants attended the Second Tsunami Symposium held at the East-West Center, University of Hawaii, May 28-31, 2002 (see related article) where they heard paper presentations on tsunami propagation physics, vulnerability and hazard assessment, mega-tsunamis, the U.S. National Tsunami Hazard Mitigation Program, and made field visits to sites where tsunami impacts and deposits from the 1946 Aleutian, 1952 Kamchatka, and 1960 Chilean tsunamis were seen.

PTWC Geophysicist-in-Charge Dr. Chip McCreery discusses tsunami operations with Rouillon and Arreaga in PTWC operations center

PTWC Senior Electronic Technician Rich Nygard (middle), Arreaga (left), and Rouillon (right) at Makapuu, Oahu, tide gauge station.

During the second week, the scientists were provided with overviews of earthquake seismology, tsunamis and tsunami generation, the real-time evaluation of earthquakes for tsunamigenic potential, the history and operations of the Tsunami Warning System in the Pacific, and the roles of national and regional tsunami warning centers in evaluating tsunamigenic potential and issuing timely warning messages to government emergency officials, who can then act to save lives and reduce damage to coastal communities. Field visits were made to the operational centers of the Richard H. Hagemeyer Pacific Tsunami Warning Center (PTWC), the Hawaii State Civil Defense (SCD) Emergency Operations Center, and the Hawaii County Civil Defense Agency (HCDA), where Dr. Charles (Chip) McCreery, PTWC Geophysicist-in-Charge, Brian Yanagi, SCD Tsunami Program Manager, and Dr. Patricia Arthur, HCDA Plans and Operations Officer, briefed Arreaga and Rouillon on their operations and equipment, and answered questions.

Rouillon (left) and Arreaga (right) visit PTWC station HON seismic vault to view 3-component, Geotech S-13 short-period seismometers.

On the last day, each participant gave a presentation on their country's Tsunami Program, and with their assistance, ITIC produced tsunami awareness bookmarks and stickers in Spanish for them to return home with. English and Spanish samples are included in this issue of the Tsunami Newsletter. For additional copies, please contact ITIC at itic.tsunami@noaa.gov.

IOC TSUNAMI PROGRAM ACTIVITIES

IOC Executive Council Reviews Tsunami Programme

The Thirty-fifth Session of the Executive Council of the Intergovernmental Oceanographic Commission (IOC) was held on June 4-14, 2002 at UNESCO House, Paris, France. A review of the progress of the Tsunami Programme (Section 4.3.1) was held on Friday, June 7. During the review, Dr. Francois Schindele (France), International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU) Chairman, presented a summary of the ITSU-XVIII meeting and gave a Tsunami Programme progress report to the IOC Assembly. After the report, the Executive Council expressed appreciation for the support provided by Chile, France, the Republic of Korea, and the U.S.A, and paid tribute to the late Richard Hagemeyer for his substantial contributions to the Tsunami Programme. It especially noted with concern the lack of staff and financial resources necessary to fully implement the ITSU Programme, and called on Member States to increase their investment in national tsunami warning and mitigation facilities as the IOC cannot be expected to fully support these efforts. The Executive Council then endorsed the Report and Recommendations from ITSU-XVIII, and adopted Resolution EC-XXXV.1 (Page 4).

In his summary of the Eighteenth Session of the ICG/ITSU (Cartagena, Colombia, October 8-11, 2001), the Chairman reported on the importance of improving IOC sea level gauge networks used by the Tsunami Warning System in the Pacific for detecting and evaluating tsunami waves, and issuing, continuing and canceling tsunami warnings and watches. Member States were requested to review their existing sea level gauges, to upgrade them, and to add new gauges as necessary. The use of the data from existing gauges in multiple fields of study, for example, for national tidal network information and for research on long-term sea level change (e.g., Global Ocean Observing System program), must be encouraged and is necessary for the long-term support and maintenance of the gauges. Dr. Schindele noted, however, that the replacement of continously-recording analog instruments with digital systems that discretely sample at less frequent intervals, has had the result of downgrading the value of the data streams for tsunami warning purposes. This is because a complete time series documenting the entire wave train history is usually not collected by the digital systems.

With regard to Tsunami Warning criteria, the Group recommended the adoption of the moment magnitude (Mw) as the new reference magnitude, and upgrades in warning criteria thresholds for information, warning, and watch bulletins. During the Session, a revised version of the Intra-Americas Seas Tsunami Warning System proposal was prepared and presented, and subsequently endorsed by IOCARIBE-VII in March, 2002. Additional discussion topics included the development of a CD-ROM and Web version of the Historical Tsunami Data Base in the Pacific (HTDB/PAC), new seismological methods to estimate and identify which parts of the Pacific Ocean will be threatened by a tsunami, and training and education activities. Presently, the Tsunami Glossary is ready for publication and a press kit is being developed. An evaluation of the Tsunami Programme will be carried out during this intersessional period. In his progress report, the Chairman emphasized the lack of adequate funding and staff to proactively meet the needs of issuing effective tsunami warnings in the Pacific, as well as in other areas of the world.

Tsunami Programme Trust Fund

In April, 2002, the IOC sent a letter to Member States asking them to consider additional support through contributions directly to the Tsunami Programme Trust Fund. In response, UNESCO/IOC received US $1000 in May, 2002, from Young-Soon Cho, Director of the Earthquake Division, Korea Meteorological Administration, as a small contribution to promote tsunami program development.

**After an earthquake,
a tsunami may follow.
Move quickly to higher ground.**

International Tsunami Information Center, Honolulu, HI USA
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IOC EXECUTIVE COUNCIL RESOLUTION EC-XXXV.1

THE INTERNATIONAL CO-ORDINATION GROUP FOR
THE TSUNAMI WARNING SYSTEM IN THE PACIFIC

The Executive Council,

Recalling that the IOC Tsunami Programme was identified by the IOC Governing Bodies as a high priority and flagship programme of the Commission, being a unique programme within the IOC fully dedicated to the co-ordination of an operational natural hazard warning system with the goal of reducing the tsunami danger and its impact on coastal communities,

Noting the decision of IOCARIBE-VII on the establishment of the Tsunami Warning System in the Intra-Americas Sea (IAS) region,

Considering the Summary Report and Recommendations of the 18th Session of the International Coordination Group for the Tsunami Warning System in the Pacific (ITSU-XVIII) held in Cartagena, Colombia, from 8 to 11 October 2001, and the progress achieved by the Group in the implementation of the ITSU Programme,

Appreciating highly the support of Chile, France, the Republic of Korea and the USA provided to the IOC Tsunami Programme in 2001-2002 through Trust Fund and in-kind contributions,

Endorses the Summary report;
Approves the recommendations of ITSU-XVIII;

Stresses the importance of the International Tsunami Information Centre (ITIC) in implementing the Tsunami Programme in the Pacific, and

(i) thanks the USA for its continued support to this facility and Chile for providing support to the ITIC Associate Director,

(ii) invites these Member States to continue their support, and requests other Member States to assist with the further development of the ITIC;

Encourages Member States, particularly those affected by the threat of tsunamis, to actively contribute towards the further development and maintenance of the Tsunami Programme, either through financial contributions to the IOC Trust Fund, staff support or in-kind contributions;

Invites ICG/ITSU to provide knowledge and expertise to participating Member States in the implementation of the IAS project;

Urges Member States undertaking civil defence measures with regard to the threat of tsunamis to contribute their data to the international warning system and to fully support the ITSU Programme;

Instructs the IOC Executive Secretary to urgently take action to strengthen the staff situation in support of the ITSU Programme at the IOC Secretariat.

Tsunami awareness bookmarks and stickers were recently created in English and Spanish by ITIC. For additional copies, please contact ITIC at itic.tsunami@noaa.gov.

SECOND TSUNAMI SYMPOSIUM REVIEW - May 28-31, 2002, Honolulu, Hawaii

Over 50 international scientists attended The Second Tsunami Symposium, where they heard about recent advances in tsunami research. With the development in Switzerland of laboratory tsunami landslide generators in the last few years, scientists are now able to measure critical parameters in the tsunami generation and propagation process. These studies have provided the inputs to theoretical models which have successfully replicated tsunami landslide historical observations. Over the last decade, scientists at the U. S. Los Alamos National Laboratory and Science Applications International Corporation have developed a compressible Eulerian hydrodynamic code utilizing adaptive mesh refinement techniques that is capable of solving the tsunami generation, propagation, and inundation problem with a single, large, three-dimensional, computer simulation using appropriate grid resolutions and realistic equations to describe the Earth's atmosphere, ocean, and crust. Symposium scientists presented model results that showed remarkable realism and detail for the 1958 Lituya Bay, Alaska, landslide and tsunami, and for tsunamis that could be generated by meteorite or asteroid impacts (http://www.spacedaily.com/news/earthquake-02a.html).

The possible role of gas hydrates in contributing to slope instability and inducing tsunami generation generated much discussion during an all-day workshop. In addition, a number of papers on tsunami hazards and vulnerability, and tsunami historical events were presented, including studies in Greece, eastern Canada, Indonesia, Cyprus, Aruba, the Mediterranean, Peru, and the U.S. (Alaska, Hawaii.

Science of Tsunami Hazards *editor, Dr. Charles Mader (left) discusses Symposium agenda with 1999-2002 Tsunami Society Secretary Michael Blackford (right).*

The Symposium program with abstracts and the 2002 issues of the *Science of Tsunami Hazards* journal can be accessed online at http://www.sthjournal.org. Earlier issues can be accessed at http://epubs.lanl.gov/tsunami/ . The Tsunami Society promotes the awareness and mitigation of tsunami hazards by sponsorship of workshops, meetings and symposia and by the dissemination of knowledge about tsunamis to scientists, officials and the public in part through its international electronic refereed journal. The Society provides a forum for discussion and interactions among its members, government agencies, and the public. Further information on The Tsunami Society, including membership information, can be found at http://www.sthjournal.org/soc.htm. During the Tsunami Symposium, The Tsunami Society elected a new slate of officers who will hold office until the Third Tsunami Symposium planned for May 24-26, 2005 in Honolulu, Hawaii.

The Society also established an Ad Hoc Committee on Mega-Tsunamis to evaluate currently available data and research efforts in response to recent media attention that sensationally and erroneously suggested that volcano island flank failures would generate ocean-wide tsunamis capable of devastating densely-populated coastlines at locations distant from the source (e.g., across the Atlantic or Pacific Oceans). The Committee, consisting of George Curtis (Chair), Dr. Eddie Bernard, Dr. Laura Kong, Dr. Charles Mader, Dr. Tad Murty, and Dr. George Pararas-Carayannis, will develop a scientifically-based position paper on the occurrences of mega-tsunamis in the past, and the likelihood for such events in the future.

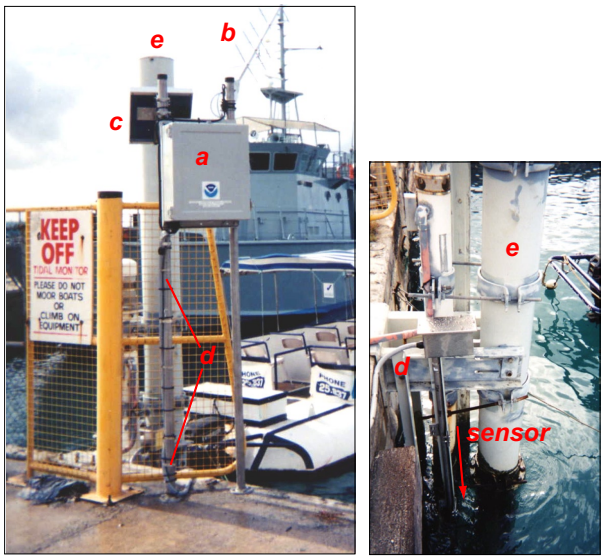
Outgoing Tsunami Society President Dr. Tad Murty (left) presents Dr. George Pararas-Carayannis (right) and his wife (center) with The Tsunami Society Award recognizing his outstanding and original contributions to the science of tsunami hazards. Now retired, but still active, Dr. Pararas-Carayannis is a former director of the International Tsunami Information Center and co-founder and officer of the Tsunami Society.

The Tsunami Society also presented an Award to Tom Sokolowski, current Geophysicist-in-Charge at the U.S. West Coast / Alaska Tsunami Warning Center, for his leadership in the development and evaluation of techniques for real-time prediction of far-field tsunami amplitudes and hazard evaluation.

PTWC NEWS

PTWC Rarotonga sea-level gauge re-established

In April, 2002, Richard H. Hagemeyer Pacific Tsunami Warning Center (PTWC) Electronics Technician Steve Wallace re-established the PTWC sea-level station at Rarotonga, Cook Islands. The station now transmits tide data sampled at 2-minute intervals hourly by satellite to PTWC, and will provide timely readings of eastward-heading energy from any tsunami generated in the Tonga Trench. It is co-located in Avarua Harbor with Australian National Tidal Facility (NTF) sea-level instrumentation that currently provides 6-minute-sampled data. Wallace worked with Dr. Wolfgang Scherer, NTF Director, and Allan Suskin, Head of Instrumentation, who provided technical information and drawings to engineer a successful installation of the PTWC Druck pressure sensor, Vaisala 555 data collection platform, 12-volt battery and solar panel for power, and satellite transmitting antenna. Nooroa Roi, Fisheries Officer, Ministry of Marine Resources, Government of the Cook Islands, and Tony Utanga (retired from Ministry of Marine Resources), provided important local logistical assistance, and Arona Ngari, Manager, Cook Island Meteorological Service, will act as a point-of-contact for station maintenance.



Rarotonga PTWC tide station, Avarua Harbor, Cook Islands. The fiberglass box containing the data collection electronics package (a), antenna (b), and solar panel (c) were installed on a pier next to the NTF instrumentation. Conduit (d) containing cables connecting the sensor, located at a depth of five feet below low-tide water level, to the data collection box on the pier, was externally attached to the NTF environmental tube (e).

Dr. David Burwell, a physical oceanographer from South Florida University, recently joined the PTWC staff. He formerly operated a network of coastal sea level gauges along the coast of Florida primarily for the purpose of monitoring and studying hurricane storm surge. Aside from his standby watch duties at PTWC, Dr. Burwell will be using his skills to help with the development and implementation of data sources and software tools to enable better real time forecasting of tsunamis.

NATIONAL CONTACT UPDATES

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CONFERENCES

July 9-12 (Tuesday-Friday) **Western Pacific Geophysics Meeting 2002**, Wellington, New Zealand. Ocean Sciences Special Session #10; Tsunami, Storm Surge, Relative Sea-Level and Coastal Change, A special session proposed by A.C. Hinton (a,b) and W.P. de Lange; (a) Department of Earth Sciences, University of Waikato, Private Bag 3105, Hamilton, New Zealand, (b) School of Geography, Leeds University, Leeds, LS2 9JT, U.K. Email: a.c.hinton@leeds.ac.uk or w.delange@waikato.ac.nz; Web site: http://www.agu.org/meetings/wp02top.html for meeting details.

August 14-15 (Wednesday-Thursday) Te Papa, Wellington, New Zealand, **The 5th New Zealand Natural Hazards Management Conference 2002** . The Institute of Geological and Nuclear Sciences (GNS), the National Institute of Water and Atmospheric Research (NIWA), Ministry of Civil Defence and Emergency Management, Wellington City Emergency Management Office, Wellington Regional Council, and the Earthquake Commission (EQC) invite you and your colleagues to participate in the 5th New Zealand Natural Hazards Management Conference in August 2002. The conference will provide a forum to discuss the integration of hazard information into effective risk management, including: Applying hazard information to best practice planning, exploring new technologies - advances in science application, natural hazard mitigation for industry and creating resilient communities through integrating science and practice. This information is taken from http://www.gns.cri.nz/news/conferences/hazconf2002.htm. For further information please contact: Diane Tilyard, Wairakei Research Centre, Institute of Geological & Nuclear Sciences, Private Bag 2000, TAUPO New Zealand; Tel: (07) 374 8211; Fax: (07) 374 8199; Email: d.tilyard@gns.cri.nz.

August 15-17 (Thursday-Saturday) Harbin, China and **August 19-20** (Monday and Tuesday) Hong Kong, **International Conference on Advances and New Challenges in Earthquake Engineering Research (ICANCEER-2002).** Sponsor: Asian-Pacific Network of Centers for Earthquake Engineering Research (ANCER - a new consortium committed to enhancing research, education, and technology transfer to reduce seismic hazards). The event will have two consecutive back-to-back meetings in different locations. For Harbin conference, contact: Xiaozhai Qi, Institute of Engineering Mechanics, China Seismological Bureau, 9 Xufu Road, Harbin 150080, China; tel: 86-451-665-2625; fax: 86-451-666-4755; e-mail: qxz@iem.net.cn/ or qxz@public.hr.hl.cn. For the Hong Kong conference, contact: Jan-Ming Ko, Faculty of Construction and Land Use; The Hong Kong Polytechnic University; Hung Hom, Kowloon, Hong Kong; Tel: 85-227-665037; Fax: 85-223-622574; E-mail: cejmko@polyu.edu.hk. For both conference programs, registration, and other information, visit http://www.nd.edu/~quake/ICANCEER/.

September 10-15 (Tuesday-Sunday) Petropavlovsk-Kamchatskiy, Russia, **Local Tsunami Warning and Mitigation.** International Workshop organized by the IUGG Tsunami Commission (IUGG/TC) and the International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU) in commemoration of the 50th Anniversary of the 1952 Great Kamchatka Earthquake and Tsunami. Co-conveners are Dr. Joanne (Jody) Bourgeois (j.bourgeo@u.washington.edu) and Dr. Mikhail Nosov (psiwc47@phys.msu.su). The purpose of the workshop is to consider the local tsunami problem and to discuss fundamental and applied studies directed toward reduction of the local tsunami hazard. The result of the workshop will be recommendations on strategies for local tsunami warning and mitigation. The homepage of the workshop is found at http://oceanc47.phys.msu.su/.

October 3-6 (Thursday-Sunday) Antalya, Turkey **HAZARDS 2002 SYMPOSIUM** Ninth International Symposium on Natural and Human-made Hazards *"Disaster Mitigation in the Perspective of the New Millennium"* Natural Hazards Society Organizing Committee headed by Professor Dr. Nuray Karanci and Associate Professor Dr. Ahmet C Yalciner, Middle East Technical University, Turkey. HAZARDS 2002 is about geological, meteorological, hydrological, marine, and human-made hazards, with specific topics at this symposium including disaster prevention, mitigation and management, public education and preparedness, lessons from past disasters, teleseismic & local tsunamis (generation, propagation, modeling), the IDNDR/ISDR, NGO/NPO, and volunteer contributions. To learn more about the conference see http://www.hazards2002.metu.edu.tr\

CONFERENCES, *continued*

October 6-20 (Sunday-Sunday) Beijing, China, **The 1st International Training Course on Earthquake Disasters and Disaster Mitigation for Developing Countries.** Sponsors: Ministry of Science and Technology (MOST), Commission on Earthquake Hazard, Risk and Strong Ground Motion (SHR), IASPEI, Asian Seismological Committee(ASC), and Seismological Society of China (SSC). The course consists of four parts: lectures, practice and visits, discussion and exchanges, and summary. Participants will present papers to the training session, and a seminar will address developing national seismic observation systems and countermeasures and experiences in seismic hazard mitigation. For more information, contact: Su, Xiao-Lan, 5 Minzudaxuenan Road, IGCSB, Beijing 100081, China; Tel: 86-10-6846-7978; Fax: 86-10-6841-5372; E-mail: suxl@eq-igp.ac.cn; Web site: http://www.icce.ac.cn/most/workshop.htm.

October 10-11 (Thursday-Friday), New Delhi, India, **Seminar on Women and Disaster Management.** Sponsored by the Indian Environmental Society (IES) this two day seminar on the occasion of World Disaster Day is being held in order to understand and improve the socio-economic condition of women after and before the natural disaster and also to highlight the role of women in disaster management. Contact: Indian Environmental Society U-112, Vidhata House, 3rd Floor, Shakar Pur, Vikas Marg Dehli--110092, Tel: (911)2046823, Fax: (911) 2223311, E-mail: iesenro@del2.vsnl.net.in; Web site: http://www.iesglobal.org.

October 15-18 (Tuesday-Friday), Shanghai, China, **5th International LACDE Conference.** The Shanghai Municipal Civil Defense Office and the Mayor of Shanghai, Mr. Xu Kuangdi, will be hosting the next international LACDE conference to discuss disaster and emergency preparedness and management. The conference will focus on systems to reduce city disasters, regulation and preparation, disaster communications, building safety, disaster (fire, earthquake, storm etc.) management and emergency rescue technology and equipment. For further information contact the International Secretariat or the conference host:

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Located in Honolulu, the International Tsunami Information Center (ITIC) was established on 12 November 1965 by the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO). In 1968, IOC formed an International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ ITSU). The present 25 Member States are: Australia, Canada, Chile, China, Colombia, Cook Islands, Costa Rica, Democratic People's Republic of Korea, Ecuador, Fiji, France, Guatemala, Indonesia, Japan, Mexico, New Zealand, Nicaragua, Peru, Philippines, Republic of Korea, Samoa, Singapore, Thailand, the Russian Federation and the United States of America.

http://www.shoa.cl/oceano/itic/frontpage.html (Chile Site)

http://www.prh.noaa.gov/itic/ (USA Site)

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